IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

SIEMENS MEDICAL SOLUTIONS USA, INC.,	)	
Plaintiff,	)	
v.	)	C.A. No. 07-190 (SLR)
SAINT-GOBAIN CERAMICS & PLASTICS, INC.,	)	**REDACTED VERSION**
Defendant.	)	

PLAINTIFF'S OPENING BRIEF
IN SUPPORT OF ITS MOTION FOR PRELIMINARY INJUNCTION

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INTRODUCTION

United States Patent No. 4,958,080 (Ex. 1, "'080 patent") claims a gamma or X-ray detector that incorporates a scintillator – a lutetium oxyorthosilicate (LSO) crystal – that has been widely acknowledged as a breakthrough in the fields of scintillation physics and medical imaging. Siemens Medical's PET scanners using LSO technology have revolutionized the industry and garnered accolades worldwide. Even Saint-Gobain credits the '080 patent as describing a "new family of crystals" with "excellent" scintillation properties – the sort that result in better medical care daily around the globe.

In an attempt to gain the benefit of the '080 patent technology without taking a patent license, Saint-Gobain has been selling lutetium yttrium orthosilicate (LYSO) crystals as scintillators for gamma ray detectors such as those used in PET scanners. These LYSO crystals substitute only a small amount of the lutetium in the LSO crystals claimed in the '080 patent with a dash of another rare earth element (yttrium) that has very similar properties. As a result, scientists in this field fully expected that the scintillation properties of Saint-Gobain's LYSO crystals would be almost, if not exactly, identical to those of the LSO scintillation crystals claimed in the '080 patent. In fact, LYSO crystals were created to mimic the scintillation properties of the LSO crystals claimed in the '080 patent as closely as possible, and their designers described the crystals as interchangeable.

Saint-Gobain's attempt to circumvent the literal scope of the '080 patent claims by replacing a small amount of the claimed lutetium with an element known to be similar is exactly what the doctrine of equivalents is intended to prevent. Indeed, the Supreme Court addressed strikingly similar acts of infringement in *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605 (1950), and found it "difficult to conceive of a case more appropriate for application of the doctrine of equivalents" to prevent that infringing activity. *Id.* at 612.

Despite its knowledge of the '080 patent and its previous statements about the novelty of the invention claimed therein, Saint-Gobain nevertheless went ahead and introduced its imitation crystals – successfully urging at least one of Siemens Medical's medical imaging competitors (Philips) to incorporate those crystals into infringing PET scanners over the past year. By Philips' own admission, it needed the patented crystal technology to get its next generation of PET scanners to market. Rather than approaching Siemens Medical for a license to practice the invention claimed in the '080 patent, Saint-Gobain and Philips decided to ignore the '080 patent, apparently believing that, as the term of the '080 patent drew to a close, Siemens Medical would not be able to go to court and enforce the '080 patent before it expired.

Saint-Gobain's attempt to effectively shorten the life of the '080 patent and compel Siemens Medical to sue for after-the-fact royalties is improper. Such sharp practices designed to flout a valid United States patent should not be tolerated. To prevent Saint-Gobain's tactical infringement of the '080 patent and give effect to the full term of that patent, Siemens Medical respectfully requests that this Court preliminarily enjoin Saint-Gobain from selling its LYSO crystals for use in a gamma ray or X-ray detector.

NATURE AND STAGE OF THE PROCEEDINGS

In 2000, a predecessor of Plaintiff Siemens Medical Solutions USA, Inc. ("Siemens Medical") – CTI Molecular Imaging, Inc. ("CTI") – revolutionized the field of positron emission tomography ("PET") when it introduced the first commercial PET scanner to use a lutetium-based scintillation crystal. The improved scintillation properties of that crystal – made of cerium-doped lutetium oxyorthosilicate ("LSO" or "Ce:LSO") – allowed Siemens Medical's PET scanner to give physicians much clearer images of the area of interest within a patient and thus potentially save lives.

The use of LSO crystals to detect gamma rays was first described in the '080 patent – the patent-in-suit, which is exclusively licensed to Siemens Medical. The '080 patent issued from an application originally filed on October 6, 1988, and, as a result, the patent will expire on October 6, 2008 – a little over a year from now. Effectively, the only means by which Siemens Medical can exercise its right to exclude Saint-Gobain from practicing the patented invention is through this motion for preliminary injunction, as it is otherwise unlikely that a final judgment will be entered by this Court before the '080 patent expires.

Although the '080 patent broadly claims X-ray and gamma ray detectors that incorporate LSO crystals, its description of the use of such detectors focused on oil drilling applications, the business of patent owner Schlumberger Technology Corporation. It was CTI that envisioned using that LSO crystal technology in the field of medical imaging. CTI acquired an exclusive license to the '080 patent for all fields of use other than "oil well logging, logging-while-drilling or formation evaluation," and invested significant research and development resources into adapting the LSO technology for use in PET scanners. As a result of those efforts, following Siemens Medical's acquisition of CTI, Siemens Medical's LSO-based Biograph PET/CT scanners, which combine positron emission tomography and computerized tomography scanners, have further enhanced their reputation as being at the forefront of PET scanning technology and are a significant commercial success.

Saint-Gobain has attempted to avoid the claim limitation of the '080 patent that requires the claimed detector to include an LSO crystal by instead using a crystal that replaces a small amount of the lutetium (the "L" in LSO) with a chemical element that has very similar electrochemical properties—yttrium (the "Y" in LYSO). Saint-Gobain's resulting lutetium-yttrium orthosilicate ("LYSO") crystals have almost identical scintillation properties to the LSO

crystals recited in the claims of the '080 patent. Indeed, in first making the LYSO crystal, its designer – a University of Florida professor named Bruce Chai – intended to create a crystal whose scintillation properties mimicked those of Siemens Medical's LSO crystals.

Armed with the knowledge of these crystals' equivalent scintillation properties, Defendant Saint-Gobain Ceramics & Plastics, Inc. ("Saint-Gobain") started making and selling its PreLude 420 LYSO scintillation crystals and marketing these crystals as having a "main application . . . in tomographic devices to ***detect gamma ray emissions*** in medical exams for identifying tumors." (Ex. 2, http://www.saint-gobain.com.br/versao2006/ingles/inovacao.aspx, at 3 (emphasis added).). Saint-Gobain is the only known manufacturer of LYSO crystals for commercial applications. In keeping with Dr. Chai's admonition to "minimize the yttrium content" in its LYSO crystals, Saint-Gobain's LYSO crystals represent only a 10% (by mole) substitution of yttrium for the lutetium in one of the LSO crystals described in the '080 patent claims. At those levels, the substitution of yttrium for lutetium in Saint-Gobain's LYSO crystals does practically nothing to change the scintillation properties of the crystals, as confirmed by Saint-Gobain's own product literature and data from Siemens Medical's testing of sample Saint-Gobain crystals.

At least one competitor of Siemens Medical in the PET scanner market – Philips – recently started offering its own PET/CT scanner using Saint-Gobain's LYSO scintillation crystals (branded Philips's "Gemini TF" or "Gemini Raptor" scanner). Philips' marketing materials tout the LYSO crystal's usefulness in allowing it to offer a "time-of-flight" image correlation feature. Philips' sale of the Gemini TF scanner constitutes a direct infringement of the '080 patent.

At the preliminary injunction stage, there is a presumption that any infringement of the '080 patent will cause Siemens Medical irreparable harm. And in this case, that presumption is clearly borne out by the facts. Because of Philips' direct infringement and Saint-Gobain's inducement of and contribution to that infringement, Siemens Medical has lost sales of PET/CT scanners, as well as related services. Just as importantly for this motion, Siemens Medical's reputation as the unquestioned technological leader in the PET scanner market has suffered, because its own technology is being used against it. [redacted]

To prevent this irreparable harm, Siemens Medical respectfully requests that this Court preliminarily enjoin Saint-Gobain from making, using, selling, offering for sale or importing LYSO crystals for use in a "gamma ray or x-ray detector."

SUMMARY OF ARGUMENT

Devices that incorporate Saint-Gobain's LYSO crystals in a gamma ray or X-ray detector, such as Philips' Gemini TF PET/CT scanner, infringe the '080 patent, because they meet the scintillator element of claim 1 under the doctrine of equivalents and meet every other claim element literally. At base, Saint-Gobain makes and sells a crystal that sprinkles in a minor amount of yttrium in place of a small portion of the lutetium called for in the patent claims in an attempt to avoid infringing the '080 patent. But, under the "function-way-result" test for equivalence, Siemens Medical's testing of sample Saint-Gobain LYSO crystals as well as Saint-Gobain's own product literature confirm that there is no meaningful difference between the scintillation properties of the claimed LSO crystals and the infringing LYSO crystals. Furthermore, the two crystals are equivalent under the "known interchangeability" test, as those

who first made LYSO crystals acknowledge that those crystals are not only similar to, but were designed to ***mimic***, the scintillation properties of the LSO crystals claimed in the '080 patent. Saint-Gobain's own product literature emphasizes the similarity between these crystals for PET applications.

Saint-Gobain is liable as both a contributory infringer and for inducing infringement by its customer, Philips. Saint-Gobain's product literature not only notes, but boasts about, the superior characteristics of its PreLude 420 LYSO crystals for detecting gamma rays in general and for PET applications in particular. The infringing LYSO crystals are not "staple articles" of commerce, because no use for those crystals other than in a gamma ray or X-ray detector is ever described. This evidence shows that Saint-Gobain not only knew of the '080 patent and the infringing use of its LYSO crystals in PET and other gamma ray or X-ray detector applications, but also that it encouraged that infringement.

The '080 patent should be presumed to be valid and enforceable at this stage of the proceedings. Even without that presumption, the facts show that the LSO-based detectors claimed in the '080 patent have been widely recognized in the field as novel inventions, including by both Saint-Gobain and those who first created LYSO crystals. Dr. Melcher's work with LSO crystals has garnered him prestigious accolades from his fellow scientists in the field of nuclear and plasma sciences.

The facts present a clear case of infringement of the '080 patent by Saint-Gobain, as well as of the '080 patent's validity. Accordingly, this Court should presume that Saint-Gobain's making, use and sale of LYSO crystals is causing irreparable harm to Siemens Medical. In addition, the facts bear out that harm – Siemens Medical has suffered significant lost sales, damage to reputation and disturbance to future business plans as a result of Saint-Gobain's

and its customers' infringement of the '080 patent. As such, the Court should grant a preliminary injunction preventing Saint-Gobain from further infringement pending trial.

STATEMENT OF FACTS

A. POSITRON EMISSION TOMOGRAPHY

In positron emission tomography, the radioactive decay of an isotope injected into a patient's body creates a positron. (Weber Aff. ¶ 20.) When that positron collides with and destroys an electron in the patient's body, two high-energy gamma-ray photons are produced. (*Id.*) These photons travel in opposite directions 180° apart, and each is ultimately detected by scintillator crystals – typically, thousands of scintillator crystals arrayed in a ring configuration – that encircle the patient. (*Id.*) The scintillator crystals convert the gamma rays into photons of visible light that can be measured with photodetectors. (*Id.*) Images representing the three-dimensional distribution of the radioactivity within the patient are then constructed based on the number and location of gamma ray photons detected. (*Id.*)

B. DEVELOPMENT OF THE LSO CRYSTAL AND THE '080 PATENT

The use of LSO crystals to detect gamma rays was first described and claimed in the '080 patent. Saint-Gobain itself has acknowledged the novelty of the '080 patent and the LSO crystals described therein:

> A new family of crystals was developed at the end of the 1980s in order to obtain scintillator crystals having a high light yield, short luminescence decay times and a high detection efficiency: these crystals are of the cerium-activated lutetium oxyorthosilicate (LSO) type and formed the subject-matter of patent U.S. Pat. No. 4,958,080.

(Ex. 3, United States Patent No. 6,818,896, col. 1, l. 65-col. 2, l. 3 (assigned to Saint-Gobain Cristaux & Detecteurs).) Others in the field have also recognized that the LSO crystals described in the '080 patent were a leap forward in scintillation crystal technology:

> In the late 80's, the Ce doped LSO crystal was disclosed as a good scintillator material. . . . Compared with all the other existing known scintillator crystals, Ce doped LSO seems to have the best combination of all the needed properties for PET or other high energy gamma-ray detector application.

(Ex. 4, United States Patent No. 6,624,420, col. 2, ll. 28-44.)

The '080 patent has only two claims:

1. A gamma ray or x-ray detector, comprising:
a scintillator composed of a transparent single crystal of cerium-activated lutetium oxyorthosilicate having the general formulation $Ce_{2x}Lu_{2(1-x)}SiO_5$, where x is within the range of from approximately $2x10^{-4}$ to approximately $3x10^{-2}$, and
a photodetector optically coupled to the scintillator for producing an electrical signal in response to the emission of a light pulse by the scintillator.

2. The detector of claim 1 wherein x is within the range of approximately $1x10^{-3}$ to approximately $4.5x10^{-3}$.

(*Id.*, col. 12, ll. 7-18.) The specification of the patent speaks at length about the improved scintillation properties – specifically, light output, energy resolution, scintillation decay time, and index of refraction – of the LSO crystals described in the "scintillator" limitation of the claims. (*See id.*, col. 8, ll. 13-56.)

This is not the first time that a company has attempted to circumvent the '080 patent (and corresponding foreign patents) by making and selling LYSO crystals. Photonic Materials, Ltd., a Scottish company, was producing LYSO crystals for much the same application. In April 26, 2006, Siemens Medical enforced the European patent corresponding to the '080 patent in a Scottish court, receiving an injunction ("interdict") barring Photonic Materials from making its infringing scintillator crystals. (Ex. 5, April 26, 2006 Order granting interdict).

C. SIEMENS MEDICAL'S LSO-BASED PET SCANNER AND THE NEXT GENERATION

CTI, a predecessor of Plaintiff Siemens Medical, envisioned the potential to use LSO crystals in the field of medical imaging. It exclusively licensed the '080 patent for all fields of use other than "oil well logging, logging-while-drilling or formation evaluation" (Ex. 6, Exclusive Patent and Technology License Agreement at 2-3), and poured significant research and development resources into adapting the LSO technology for use in PET scanners. Those efforts came in parallel with Siemens Medical's efforts to develop a single scanner with both PET and CT (Computerized Tomography) capabilities. The resulting Biograph PET/CT scanner was named Time Magazine's Medical Invention of the Year in 2000. (Ex. 7, A Winning Combination, Time Magazine (Dec. 4, 2000).)

CPS, a joint venture between Siemens Medical and CTI, revolutionized the PET field when it introduced the first commercial PET scanner to use a lutetium-based scintillation crystal, one made of cerium-doped lutetium oxyorthosilicate ("LSO" or "Ce:LSO"), in 2000. (Lusser Aff. ¶ 4.) The properties of LSO were so far superior to those of the prior art bismuth germanate (BGO) crystal previously used in the industry, that Siemens Medical replaced its BGO-based PET scanners with the patented LSO-based PET scanners. (*Id.*) The improved scintillation properties of the LSO crystal allowed Siemens Medical's PET scanner to more efficiently use the radiation emitted from a patient and form much clearer images of the area of interest within that patient. (*Id.* ¶ 5.) Based on the LSO crystal's improved scintillation properties and the resulting capabilities that Siemens Medical has been able to offer in its PET scanners, Siemens Medical's Biograph PET scanners have earned the reputation of being at the forefront of PET scanning technology and have enjoyed significant commercial success. (*Id.*)

As a result of its technological innovations, Siemens Medical and its predecessors have seen a steady rise in market share for its PET scanner products. In 2001, shortly after the Biograph PET/CT was first introduced, Siemens Medical had a market share of approximately [redacted] (*Id.* ¶ 6.) Sales of the BGO-based Biograph PET/CT raised Siemens Medical's market share to approximately [redacted] in fiscal year 2003, when Siemens Medical introduced its LSO-based Biograph PET/CT scanner. (*Id.*) Sales of the improved LSO-based Biograph PET/CT further raised Siemens Medical's market share. (*Id.*) But, the announcement of Philips' LYSO-based Gemini TF PET/CT scanner has drastically affected Siemens Medical's market share. For the four quarters prior to the Philips announcement (Q3 of the 2005 fiscal year through Q2 of the 2006 fiscal year) Siemens Medical's market share for PET equipment (including PET/CT systems) based on bookings was [redacted] (*Id.* ¶ 7.) For the four quarters after Philips' announcement (Q3 of the 2006 fiscal year to Q2 of the 2007 fiscal year), Siemens Medical's corresponding market share dropped to [redacted]. (*Id.*) Those sales lost to Philips have increasingly been attributed by customers to the technological features that Philips has been able to offer because it is using Saint-Gobain's LYSO crystals. (*Id.* ¶¶ 9-10.)

[redacted] (*Id.* ¶ 12.) The resulting image of the area of interest in the patient is clearer and a patient can be subjected to a lesser dose of radiation to produce the image. (*Id.* ¶ 13.)

To offer the time-of-flight feature, however, the scintillation crystals used must have a short decay time. (*Id.* ¶ 11.) Lutetium-based crystals, including the LSO crystals used by

Siemens Medical and the LYSO crystals offered by Saint-Gobain, have the requisite decay time. (*Id.* ¶ 11; Ex. 8, Philips Gemini TF brochure at 14 (noting that the "timing resolution" of LSO and LYSO are sufficient for time-of-flight applications and that prior art GSO and BGO crystals are "not optimal" and "not suitable," respectively, for such applications).)

[redacted] (Lusser Aff. ¶ 12.) [redacted]

[redacted]

(*Id.*) [redacted]

[redacted]

[redacted] (*Id.* ¶ 13.)

D. AN INFRINGING PET/CT SCANNER INCORPORATING SAINT-GOBAIN'S LYSO CRYSTAL

Philips' Gemini TF (a.k.a. "Gemini Raptor") PET/CT scanner is similar to its previous PET scanner that used GSO crystals, except for two crucial changes: (1) the original GSO scintillation crystal has been replaced with the improved LYSO crystal; and (2) the software used to reconstruct an image from the detector data has been changed. (Ex. 9, Philips' 501(k) submission to FDA ¶ I (noting "Change from GSO to LYSO crystals" and "Modifications to Reconstruction" as "the basic difference[s] in the system" from Philips' previous product).)

Saint-Gobain is the only known supplier of commercial grades and quantities of cerium-doped LYSO crystals. (Doshi Aff. ¶ 15.) Like the LSO crystals recited in the claims of the '080 patent, Saint-Gobain's LYSO crystals act as scintillators by receiving gamma rays emitted by a patient and convert them to visible light to be received by a photodetector. (Weber Aff. ¶ 20.) Moreover, Saint-Gobain's LYSO crystals perform this function in a virtually-identical way to the claimed LSO crystals – they have the same crystal structure and, at the

minimal level of yttrium substitution by Saint-Gobain, the scintillation process is still dictated by the lutetium, silicon and oxygen atoms in the crystal, with little to no effect from the yttrium atoms. (*Id.* ¶ 23, 24, 28, 39, 41.)

As a result, the scintillation properties of Saint-Gobain's LYSO crystals are virtually identical to those of the LSO crystals claimed in the '080 patent. (*Id.* ¶ 42-49.) Siemens Medical obtained two samples of Saint-Gobain's LYSO crystals and tested them for the various properties described in the '080 patent as distinguishing the claimed LSO crystals from the prior art. (*Id.* ¶ 43-44; Doshi Aff. ¶ 3-4.) The results of those tests were compared to test results for the same tests on two of Siemens Medical's LSO crystals. (Doshi Aff. ¶ 4.) Siemens Medical also conducted destructive testing on these sample crystals to determine their composition. (*Id.* ¶ 7.)

Based on the tests and comparing the properties of Saint-Gobain's crystals to the results reported in the '080 patent for LSO crystals as well as Siemens Medical's *historical data* for its commercial LSO crystals, it is clear that Saint-Gobain's LYSO crystals have substantially the same scintillation properties as the LSO crystals claimed in the '080 patent. (Weber Aff. ¶ 42-45.)

ARGUMENT

I. THE LEGAL STANDARDS

The Patent Act protects a patent owner's rights in its invention by giving courts the ability to preliminarily enjoin infringers to "prevent the violation of any rights secured by patent, on such terms as the court deems reasonable." 35 U.S.C. § 283. "The Federal Circuit standards for deciding motions to enjoin patent infringement are not intended to be any more or less stringent than those applied to requests for preliminary injunctions in other areas of law." *McData Corp. v. Brocade Commc'n Sys., Inc.*, 233 F. Supp. 2d 1315, 1319 (D. Colo. 2002)

(citing *High Tech. Med. Instrumentations, Inc. v. New Image Indus., Inc.*, 49 F.3d 1551, 1554 (Fed. Cir. 1995)). This Court should grant a preliminary injunction if Siemens Medical can show:

> (1) a reasonable likelihood of success on the merits; (2) the prospect of irreparable harm to the patent owner in the absence of the injunction; (3) that this harm would exceed harm to the alleged infringer when subject to the injunction; and (4) that granting the injunction is in the public interest.

Pfizer, Inc. v. Teva Pharms. USA, Inc., 429 F.3d 1364, 1372 (Fed. Cir. 2005) (citation omitted); *see also Abbott Labs. v. Andrx Pharms., Inc.*, 473 F.3d 1196, 1200-01 (Fed. Cir. 2007). Although all four factors must be analyzed, the first two are critical. *Jack Guttman, Inc. v. Kopykake Enterp., Inc.*, 302 F.3d 1352, 1356 (Fed. Cir. 2002).

This Court has wide discretion in deciding motions for preliminary injunction under the Federal Circuit's four-factor analysis. *Purdue Pharma L.P. v. Boehringer Ingelheim GMBH*, 237 F.3d 1359, 1363 (Fed. Cir. 2001). The grant of a preliminary injunction is reviewed on a clear error standard. *Pfizer*, 429 F.3d at 1372. The Federal Circuit routinely defers to the judgment of district courts in upholding the grant of preliminary injunctions.[1]

A. REASONABLE LIKELIHOOD OF SUCCESS ON THE MERITS

Siemens can demonstrate a "reasonable likelihood of success on the merits," by showing that "it will likely prove that [Saint-Gobain] infringes at least one valid and enforceable patent claim." *Abbott Labs.*, 473 F.3d at 1200. And unless Saint-Gobain "defends with evidence

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[1] *See, e.g., Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331 (Fed. Cir. 2003); *Monsanto Co. v. McFarling*, 302 F.3d 1291 (Fed. Cir. 2002); *Tate Access Floors, Inc. v. Interface Architectural Res., Inc.*, 279 F.3d 1357 (Fed. Cir. 2002); *Hoop v. Hoop*, 279 F.3d 1004 (Fed. Cir. 2002); *Purdue Pharma L.P. v. Boehringer Ingelheim GmbH*, 237 F.3d 1359 (Fed. Cir. 2001); *Systemation, Inc. v. Engel Indus., Inc.*, 194 F.3d 1331, No. 98-1489, 1999 WL 129640 (Fed. Cir. Mar. 10, 1999); *Bio-Technology Gen. Corp. v. Genentech, Inc.*, 80 F.3d 1553 (Fed. Cir. 1996); and *Read Corp. v. Viper Int'l Ltd.*, 78 F.3d 605, No. 95-1318, 1996 WL 78317 (Fed. Cir. Feb. 23, 1996) (all affirming district court's grant of preliminary injunction).

raising a 'substantial question' concerning validity, enforceability, or infringement," Siemens need not even "produce countervailing evidence demonstrating that these defenses 'lack[ ] substantial merit.'" *Purdue Pharma*, 237 F.3d at 1363 (quoting *Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1364 (Fed. Cir. 1997)).

As the defendant, Saint-Gobain "bears the ultimate burden of proof at trial of proving invalidity by clear and convincing evidence." *Purdue Pharma*, 237 F.3d at 1365. Thus, even though Siemens must establish that Saint-Gobain likely cannot show that the '080 patent claims are invalid to support this motion for preliminary injunction, "every patent is presumed valid, so if [Saint-Gobain] fails to identify any persuasive evidence of invalidity, the very existence of the patent satisfies [Plaintiff's] burden on validity." *Id.* Although Saint-Gobain has included boilerplate allegations in its answer that the '080 patent is "unenforceable and/or invalid for failure, at least in part, to comply with the patent laws of the United States" (Answer (D.I. 10) (Counterclaims) ¶ 7), it has not disclosed any factual basis for those allegations or offered any evidence to support them. As Saint-Gobain has not yet raised a "substantial question" regarding the validity or enforceability of the '080 patent, Siemens Medical's analysis of its likelihood of success on the merits addresses only the issue of infringement in detail in this motion. A brief discussion of validity is also included, although no specific prior art is discussed as Saint-Gobain has not pointed to any at this time.

B. IRREPARABLE HARM

"A district court should presume that a patent owner will be irreparably harmed when, as here, a patent owner establishes a strong showing of likely infringement of a valid and enforceable patent." *Pfizer*, 429 F.3d at 1381; *see also Jack Guttman, Inc.*, 302 F.3d at 1356; *Purdue Pharma*, 237 F.3d at 1363; *Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331, 1345 (Fed. Cir. 2003) (irreparable harm is presumed where plaintiff shows likely success). The legal

presumption of irreparable harm stems from the fact that the principal value of a patent is the statutory right to exclude. *Hybritech Inc. v. Abbott Labs.*, 849 F.2d 1446, 1456-57 (Fed. Cir. 1988). Accordingly, 35 U.S.C. § 283 provides for injunctive relief to "preserve the legal interests of the parties *against future infringement* which may have market effects never fully compensable in money." *Atlas Powder Co. v. Ireco Chems.*, 773 F.2d 1230, 1233 (Fed. Cir. 1985) (emphasis added). Absent preliminary injunctive relief, infringers would be "compulsory licensees for as long as the litigation lasts." *Id.*

"[W]hen the presumption of irreparable harm attaches, the burden is on the likely infringer to produce evidence sufficient to establish that the patent owner would not be irreparably harmed by an erroneous denial of a preliminary injunction." *Pfizer*, 429 F.3d at 1381.

II. THE CLAIMS ARE STRAIGHTFORWARD AND ANY DISPUTED CLAIM TERMS SHOULD BE CONSTRUED ACCORDING TO THEIR ORDINARY MEANING

"Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy." *See U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). Accordingly, claim construction is not necessary if the meaning of the claim terms is not disputed. *See id.*; *see, e.g.*, *Rogers v. Desa Int'l, Inc.*, 166 F. Supp. 2d 1202, 1204 (E.D. Mich. 2001).

For the most part, the terms used in the claims of the '080 patent are defined in the claims themselves. For example, the term "lutetium oxyorthosilicate" is further defined by a chemical formula with a variable "x," and the range of x is specifically defined in claims 1 and 2. Therefore, Siemens Medical does not believe that the construction of any of the claim terms will genuinely be disputed or that construction for any claim term is necessary.

III. SAINT-GOBAIN'S CUSTOMERS DIRECTLY INFRINGE THE '080 PATENT UNDER THE DOCTRINE OF EQUIVALENTS

Proving direct infringement is the first element of proving indirect infringement, either in the form of contributory infringement or inducement to infringe. *Epcon Gas Sys., Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1033 (Fed. Cir. 2002). To directly infringe a claim of the '080 patent, the infringing product need not satisfy every element literally – one or more elements may be met under the doctrine of equivalents. *See Pfizer*, 429 F.3d at 1376 ("To prove infringement, a patentee must show that an accused product or method meets every claim limitation either literally or under the doctrine of equivalents."). Thus, Siemens Medical can satisfy its burden of showing a reasonable likelihood of success in proving direct infringement by showing that Saint-Gobain's customers' products infringe at least one claim of the '080 patent under the doctrine of equivalents. *See, e.g., Abbott*, 473 F.3d at 1213 (affirming grant of preliminary injunction where movant demonstrated "a likelihood of success in proving infringement . . . under the doctrine of equivalents"); *Christiana Indus. v. Empire Elec., Inc.*, 443 F. Supp. 2d 870, 882 (E.D. Mich. 2006) (granting preliminary injunction where "Plaintiff established a likelihood of success of proving infringement under the doctrine of equivalents.").

The '080 Patent has only two claims, both of which literally cover a "detector" (e.g., PET scanner) that includes a "scintillator" crystal of a certain formula (*i.e.*, an "LSO crystal") and a "photodetector":

> 1. A gamma ray or x-ray detector, comprising:
> a scintillator composed of a transparent single crystal of cerium-activated lutetium oxyorthosilicate having the general formulation $Ce_{2x}Lu_{2(1-x)}SiO_5$, where x is within the range of from approximately $2x10^{-4}$ to approximately $3x10^{-2}$, and
> a photodetector optically coupled to the scintillator for producing an electrical signal in response to the emission of a light pulse by the scintillator.

2. The detector of claim 1 wherein x is within the range of approximately $1x10^{-3}$ to approximately $4.5x10^{-3}$.

In this case, Saint-Gobain's customer Philips has directly infringed the '080 patent by incorporating Saint-Gobain's LYSO crystals into PET scanners, in particular with its "Gemini TF" (or "Gemini Raptor") PET/CT scanner. The infringing scanners were tested by Philips in the United States and are currently being sold:

> "Three [Gemini TF] units are in field tests – one at the the [sic] Hospital of the University of Pennsylvania conducting research on four to five patients daily; one at University Hospitals in Cleveland imaging seven to eight patients a day and focused on clinical work; and one at Montefiore focused on quick image acquisitions that images about 15 patients per day, Philips said. Full commercial release of the system is slated for late this month.")

(Ex. 10, June 7, 2006 Health Imaging News article at 1.) In the past year, according to Philips' own statements in the recent trade press, its installations have increased ten-fold to the current point where there are "more than 30 installed [Gemini TF] systems worldwide." (Ex. 11, June 6, 2007 Health Imaging News article at 1.)

As shown in the claim chart below, Philips' Gemini TF PET/CT scanner meets all but one of the limitations of claim 1 of the '080 patent ***literally***:

'080 Patent – Claim 1	**Philips Gemini TF PET/CT System**
1. A gamma ray or x-ray detector, comprising:	The Philips scanner works by detecting gamma rays produced by radiopharmaceuticals that collect at an area of interest in a patient's body. (Ex. 12, March 27, 2006 RT Image article, at 1 (noting that, as in "conventional" PET systems, in the Philips Gemini TF system "pairs of gamma rays … are observed by the PET scanner").) Saint-Gobain provides data on the crystal's "gamma and X-ray absorption efficiency." (Ex. 13, PreLude 420 data sheet.)

a scintillator composed of a transparent single crystal of cerium-activated lutetium oxyorthosilicate having the general formulation $Ce_{2x}Lu_{2(1-x)}SiO_5$, where x is within the range of from approximately $2x10^{-4}$ to approximately $3x10^{-2}$, and	Philips' scanners incorporate Saint-Gobain's LYSO crystals as the required "scintillator." (Ex. 8, Philips Gemini TF brochure at 14 (noting that LYSO crystals were selected as a "scintillator" for their "timing resolution, stopping power & availability").) Saint-Gobain's LYSO crystals are "transparent" (Ex. 14, Saint-Gobain LYSO Material Safety Data Sheet § 9 ("Appearance: Transparent to light yellow").) Saint-Gobain's own product data sheet describes its PreLude 420 LYSO crystal as a "scintillation crystal," meaning that it is both a "scintillator" and formed from a "transparent single crystal." (Weber Affidavit ¶ 35 (citing Ex. 13, PreLude 420 data sheet at 1).) The LYSO crystals are described in Saint-Gobain's own product literature as "cerium-activated" scintillation crystals. (Ex. 13, PreLude 420 data sheet at 1 ("PreLude® 420 ($Lu_{1.8}Y_{.2}SiO_5$:Ce) is a Cerium doped lutetium based scintillation crystal").) More specifically, the composition testing performed by a third-party laboratory on behalf of Siemens confirms that Saint-Gobain's PreLude 420 LYSO crystal includes 600 ppm by weight of Cerium, *i.e.*, an amount that falls within the range of "x" in the formula recited in claim 1. (Weber Affidavit ¶ 36.) As discussed below in Section III.A., Saint-Gobain's LYSO crystal is equivalent to the lutetium oxyorthosilicate crystal recited in this element of the claim.
a photodetector optically coupled to the scintillator for producing an electrical signal in response to the emission of a light pulse by the scintillator	Saint-Gobain advertises that its LYSO crystals "emi[t] . . . scintillation light [that] matches well with the sensitivity spectrum of most PMTs [*i.e.*, photomultiplier tubes]." (Ex. 13, PreLude 420 data sheet.) In Philips' scanners, Saint-Gobain's LYSO scintillation crystals are optically coupled to photomultiplier tubes ("PMT"). (Ex. 8, Philips Gemini TF brochure at 16.) These photomultiplier tubes fall squarely within the "photodetector" limitation recited in the claims of the '080 patent. Indeed, the photodetector identified in the '080 patent's "representative embodiment" is the "photomultiplier tube 16." (Ex. 1, '080 patent, col. 3, ll. 51-53.)

Thus, the only issue is whether Saint-Gobain's cerium-doped LYSO crystal of the formulation $Lu_{1.8}Y_{.2}SiO_5$ is ***equivalent*** to the LSO crystals of the general formulation claimed in the '080 patent.

A. SAINT-GOBAIN'S LYSO CRYSTALS MEET THE "GENERAL FORMULATION" LIMITATION UNDER THE DOCTRINE OF EQUIVALENTS

Although Saint-Gobain's LYSO crystals do not *literally* meet the "general formulation" for the claimed scintillators as a result of adding a relatively small amount (roughly 10% by mole) of yttrium, the LYSO crystals still satisfy that "general formulation" limitation under the doctrine of equivalents. Saint-Gobain's attempt to get around the literal reach of the claims of the '080 patent by replacing a small amount of a claimed chemical element with another element known to have very similar properties is precisely the type of activity that the doctrine of equivalents was designed to prevent. Faced with similar facts, the Supreme Court, in its quintessential decision applying the doctrine of equivalents, held that it was "difficult to conceive of a case more appropriate for application of the doctrine of equivalents." *Graver Tank*, 339 U.S. at 612 (holding that the accused welding composition infringed under the doctrine of equivalents because "specialists familiar with the problems of welding compositions understood that manganese was equivalent to and could be substituted for magnesium . . . and their observations were confirmed by the literature of chemistry.").

Saint-Gobain's LYSO crystals satisfy the "scintillator" element under the doctrine of equivalents if they are "substantially the same as" the corresponding scintillator crystals described in the patent claim. *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1383 (Fed. Cir. 2001). At least two tests have been applied by courts to determine whether an accused product infringes under the doctrine of equivalents, either of which can be used to show equivalence: (1) the "function-way-result" test; and (2) the "known interchangeability" test. *See id.* at 1382-83 (affirming judgment of infringement under the doctrine of equivalents using either the function-way-result test or the known interchageability test); *Sofamor Danek Group, Inc. v. DePuy-Motech, Inc.*, 74 F.3d 1216, 1222 (Fed Cir. 1996) (acknowledging that the "function-

way-result" test is not necessarily "'the test'" for equivalence and "commend[ing]" evidence of known interchageability as alternative proof of equivalence). Under either test, Saint-Gobain's LYSO crystals are equivalent to LSO crystals of the general formulation recited in the claims of the '080 patent.

1. The LYSO crystal is equivalent under the function-way-result test.

The function-way-result test is satisfied if the feature of the accused product in question "performs substantially the same function in substantially the same way to achieve substantially the same result" as the element of the claimed invention. *Graver Tank*, 339 U.S. at 608. To determine what "function," "way" and "result" to consider as part of this test, the Court should confine its inquiry to the patent itself and its prosecution history. *AquaTex Indus., Inc. v. Techniche Solutions*, 479 F.3d 1320, 1328 (Fed. Cir. 2007) ("the identification of the elements of the function, way, result test solely 'entails an examination of the claim and the explanation of it found in the written description of the patent," as well as "[i]n some cases[ ] the patent's prosecution history."); *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.*, 141 F.3d 1084, 1090 (Fed. Cir. 1998) (function-way-result inquiry focuses on "an examination of the claim and the explanation of it found in the written description of the patent.").

Claim 1 of the '080 patent (as well as the rest of the patent specification) describes the function of the scintillator crystal in the claimed invention: detecting "gamma ray or x-ray radiation" to cause the "emission of a light pulse" to which the photodetector responds. Saint-Gobain's own product literature indicates that its LYSO crystals perform the identical function. For example, the product data sheet for Saint-Gobain's PreLude 420 crystal touts the fact that its "emission of scintillation light matches well with the sensitivity spectrum of most PMTs [*i.e.*, photomultiplier tubes]." (Ex. 13, PreLude 420 data sheet at 1.) It also provides

customers with data on the "gamma and X-ray absorption efficiency for various thicknesses of PreLude 420 material." (*Id.*) Thus, Saint-Gobain's LYSO crystal performs not just a similar function, but the identical function, as the claimed LSO crystal.

The "way" in which the claimed LSO crystals behave as scintillators is the same mechanism for all single-crystal scintillators. Dr. Marvin J. Weber, an expert in scintillation crystallography, describes the basic mechanism in his affidavit:

> The physical processes leading to scintillation in inorganic solids, while complex, are now generally well understood . . . . The basic process of scintillation may be divided into four stages: (1) absorption of the incident radiation (in this case, gamma rays), (2) conversion of the absorbed energy into a large number of excited electron-hole pairs by a complicated cascade process involving primary photoelectrons and secondary electrons and photons, (3) transfer of some fraction of the electron-hole energy to excitation of luminescence centers (activator ions) or recombination centers, and (4) the luminescence process, i.e. emission of light by the luminescent center.

(Weber Affidavit ¶ 18.) That scintillation mechanism is not altered by Saint-Gobain's replacement of a small amount of the lutetium in the patented crystals with a small amount of yttrium. (*Id.* ¶ 41.) In other words, the Saint-Gobain's LYSO crystals use the same four-step process to convert incoming gamma radiation to visible light as the LSO crystals of the general formulation claimed in the '080 patent.

The '080 patent also describes the improved "results" over the prior art that are achieved by the claimed LSO crystals in its description of their scintillation characteristics: "The LSO scintillator of the invention possesses certain important characteristics, most notably high light output, very short decay time and high detector efficiency, that make it superior to prior scintillators as a gamma ray or like detector . . . ." (Ex. 1, '080 patent, col. 3, ll. 24-29.) The '080 patent summarizes the relevant "scintillation properties" of the claimed LSO crystals in Table 3, focusing on "light output," "decay time," "emission peak" and "temperature response."

To determine whether Saint-Gobain's LYSO crystals achieve substantially similar results as the claimed invention, Siemens measured these scintillation properties and characteristics for two samples of Saint-Gobain's PreLude LYSO crystals. (Doshi Affidavit ¶ 3-14.) The chart below compares the data for the claimed LSO (as described in the '080 patent and as measured for crystals currently manufactured by Siemens Medical) with that for the accused LYSO crystals (as described in Saint-Gobain's product literature and as measured for the sample crystals tested by Siemens Medical). For each property, the LYSO crystal achieved substantially the same result as Siemens's patented LSO crystals. (Weber Affidavit ¶ 42-49.)

	'080 Patent	Saint-Gobain's Prelude 420 data sheet	Siemens Medical's PreLude 420 tests	Siemens Medical's LSO sample averages
Light Output	6.25 (75 relative to BGO=12)	32 (photons/keVγ)	5.6-5.7 (564-573 relative to BGO=100)	[redacted]
Decay Time (ns)	41	41	39-40	[redacted]
Emission Peak for Gamma Excitation at 20° C (nm)	426-430	420	417-423	[redacted]
Emission Max for UV Excitation (nm)	393-395		~400	[redacted]
Density (g/cm^3)	7.4	7.1	7.1	
Energy Resolution	8.8-13%	8%	8.1-9.4	[redacted]

(Weber Affidavit ¶ 44.)

The properties of the crystals are so similar, in fact, that Saint-Gobain does not attribute any special characteristics to its substitution of yttrium for 10% of the lutetium in an LSO crystal. Rather, in marketing its PreLude 420 LYSO crystal, Saint-Gobain highlights that it "is a lutetium-based scintillator which contains a radioactive isotope ^{176}Lu . . . ." Although Saint-Gobain compares its crystals to the prior art BGO crystals, which are not based on

lutetium, to show their differences, it emphasizes the similarity between the characteristics of its LYSO crystals and Siemens Medical's LSO crystals.

2. Saint-Gobain's accused LYSO crystal is equivalent to the claimed LSO crystal under the "known interchangeability" test.

An alternative test for showing equivalence is the "known interchangeability" test. "[T]he known interchangeability test looks to the knowledge of a skilled artisan to see whether that artisan would contemplate the interchange as a design choice." *Interactive Pictures*, 274 F.3d at 1383 (quoting *Overhead Door Corp. v. Chamberlain Group, Inc.*, 194 F.3d 1261, 1269-70 (Fed. Cir. 1999)). The proper time to examine whether such interchangeability was known in the art is the time of the infringement. *See Hughes Aircraft Co. v. United States*, 140 F.3d 1470, 1475 (Fed. Cir. 1998); *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 37 (1997) ("Insofar as the question under the doctrine of equivalents is whether an accused element is equivalent to a claimed element, the proper time for evaluating equivalency . . . is at the time of infringement, not at the time the patent was issued.").

LYSO crystals were described as an "invention" in United States Patent No. 6,624,420 to Chai et al. (Ex. 4, "Chai patent"), which issued on September 23, 2003.[2] The Chai patent acknowledges that "[c]ompared with all the other existing known scintillator crystals, Ce doped LSO [*i.e.*, the crystal claimed in the '080 patent asserted by Siemens] seems to have the best combination of all the needed properties for PET or other high energy gamma-ray detector

[2] The Chai patent is relevant for its teachings as to what is presently known in the art of scintillation crystallography, since the proper time for determining whether infringement under the doctrine of equivalents) has occurred is the time of the infringement. *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 37 (1997) ("Insofar as the question under the doctrine of equivalents is whether an accused element is equivalent to a claimed element, the proper time for evaluating equivalency . . . is at the time of infringement, not at the time the patent was issued."); *Hughes Aircraft Co. v. U.S.*, 140 F.3d 1470, 1475 (Fed. Cir. 1998).

application." (Ex. 4, col. 2, ll. 41-44.) Notably, the Chai patent emphasizes that one of the goals in creating LYSO crystals was to "minimize the yttrium content to retain the LSO scintillating properties." (*Id.*, col. 4, ll. 30-32.) That is exactly what Saint-Gobain has done with its PreLude LYSO crystals. The 10% (by mole) yttrium content in Saint-Gobain's crystals is well below even the lowest-yttrium-content crystal tested by Chai *et al.* (*Id.*, col. 4, ll. 51-58 (referred to as the "70% LYSO" composition).) Yet, as of its 2003 issue date, the Chai patent disclosed to those in the field that even for this crystal, in which 30% (by mole) of the lutetium had been replaced with yttrium, had very similar properties to the "pure LSO" crystals recited in the claims of the '080 patent. (*Id.*, col. 6, ll. 1-19 (Table 1).) Indeed, for some key characteristics, such as light output, the Chai patent notes that even an yttrium substitution rate of 50% (by mole) does not substantially differentiate LYSO crystals from LSO crystals. (*Id.*, col. 6, ll. 31-33 ("The light yield (or scintillating efficiency) remains constant for at least 50% percent [sic] substitution of lutetium with yttrium.").)

Almost four years ago, the Chai patent disclosed that even moderate levels (over 30% by mole) of yttrium substitution did not affect the important scintillation properties of LSO crystals. It was certainly known to Saint-Gobain, which cited the Chai patent as prior art for one of its own patents on scintillation crystals. (*See* Ex. 3, U.S. Patent No. 6,818,896.) The Chai patent conclusively shows that those of ordinary skill in this field would have "contemplate[d] the interchange" of the small amounts of yttrium included in Saint-Gobain's PreLude 420 LYSO crystal for the pure lutetium in the claimed LSO crystals "as a design choice." *Interactive Pictures*, 274 F.3d at 1383.

In his affidavit, Dr. Weber also confirms that those of skill in the art would know that substituting small amounts of yttrium for the lutetium in the claimed LSO crystals would not

substantially change the scintillation properties of the crystals. (Weber Aff. ¶ 47, 48, 50, 51.) As noted by Dr. Weber, yttrium orthosilicates have previously been described for use in known scintillation crystals. (*Id.* ¶ 23; United States Patent No. 5,164,041 ("Berkstresser patent").) Moreover, lutetium is one of the lanthanide series of elements, which, based on their relative position in the periodic table of elements, are understood to have properties (including excitation properties) similar to those of yttrium. (Weber Aff. ¶ 27-28, 30, 31, 50.)

IV. SAINT-GOBAIN CONTRIBUTORILY INFRINGES THE '080 PATENT BY SUPPLYING ITS PRELUDE 420 CRYSTALS FOR USE IN PET SCANNERS

In addition to proving direct infringement, to establish liability for contributory infringement, Siemens must show that: (1) Saint-Gobain's PreLude 420 crystal is not a staple article of commerce suitable for substantial noninfringing use; and (2) Saint-Gobain supplied these crystals knowing that they would be used in gamma ray or X-ray detectors and knowing of the existence of the '080 patent. *See* 35 U.S.C. § 271(c); *Golden Blount, Inc. v. Robert H. Peterson Co.*, 365 F.3d 1054, 1061 (Fed. Cir. 2004).

A. SAINT-GOBAIN'S PRELUDE 420 CRYSTAL IS NOT A STAPLE ARTICLE AND IT HAS NO SUBSTANTIAL NONINFRINGING USE

To be a staple article or commodity so as to avoid contributory infringement under 35 U.S.C. § 271(c), Saint-Gobain's PreLude 420 LYSO crystal must have at least one ***actual and substantial*** noninfringing use – hypothetical, impractical or merely experimental noninfringing uses do not establish a product as a staple article of commerce. *See Mentor H/S, Inc. v. Med. Device Alliance, Inc.*, 244 F.3d 1365, 1379 (Fed. Cir. 2001) (affirming contributory infringement verdict because "record does not indicate any ***actual*** uses of the device other than [the infringing use]" (emphasis added)); *Vesture Corp. v. Thermal Solutions, Inc.*, 284 F. Supp. 2d 290, 317 (M.D.N.C. 2003). The fact that an accused infringer has specifically designed and

marketed its product for the use that is alleged to infringe is highly probative of whether substantial noninfringing uses exist. *See Mentor H/S*, 244 F.3d at 1379.

As Saint-Gobain's own product literature makes clear, the only actual or practical uses for the PreLude 420 LYSO crystal are in gamma ray or x-ray detectors. Indeed, the preferred use for the accused crystals is for detecting gamma rays in PET scanners.[3] (Weber Aff. ¶ 16, 35.) Saint-Gobain's marketing focuses on this use for its LYSO crystals and highlights its ability to detect gamma rays:

> PET applications have traditionally used arrays of BGO [*i.e.*, bismuth germanium oxide, a prior art scintillator]. PreLude 420 crystal competes directly on density and surpasses BGO on energy resolution, timing and throughput.

(Ex. 13, PreLude 420 data sheet at 1.) Saint-Gobain's data sheet lists the crystal's performance characteristics for detecting gamma rays and explains that PreLude 420 is ideal for detecting gamma rays in devices that—like PET scanners—"require higher throughput, better timing and better energy resolution." (Ex. 13, PreLude 420 data sheet; *see also* Ex. 14, Saint-Gobain LYSO Material Safety Data Sheet (listing "Product Use" as "Inorganic Scintillation Detector Crystal.").) That suggests that PreLude 420 is not merely a staple article of commerce, but rather a product specifically marketed and suited for the infringing use. *See Mentor H/S, Inc.*, 244 F.3d at 1379 (affirming verdict of contributory infringement where the "defendants' manual states that Lysonix 2000 was 'specifically manufactured for [the allegedly infringing use].'").

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[3] Although Saint-Gobain's marketing appears to focus on PET scanners, the '080 patent is not so limited in claming applications of the claimed LSO crystals. *See, e.g.*, '080 patent col. 1, ll. 20-23 ("Scintillators of this class have found wide application in various fields, such as nuclear medicine, physics, chemistry, mineral and petroleum exploration, etc."). The '080 patent broadly claims "gamma ray or x-ray detector[s]." Thus, even if Saint-Gobain's PreLude 420 crystals can be used in applications other than PET scanners, so long as the crystals are used to detect gamma rays or x-rays, such uses would still infringe and would not negate liability for contributory infringement.

Beyond gamma and x-ray detection, any other uses for Saint-Gobain's PreLude 420 crystals are merely theoretical or experimental. Such uses would be legally insufficient to show that Saint-Gobain's LYSO crystal is a staple article of commerce suitable for substantial noninfringing uses. *Vesture Corp.*, 284 F. Supp. 2d at 317 ("Although it is certain that there are possible non-infringing uses for Vesture's product, it is not enough that a product or service be physically capable, as it were, of a noninfringing use." (internal quotation marks and alterations omitted)); Chisum § 17.03[3] ("The cases indicate that a suggested noninfringing use must not be farfetched, illusory, impractical or merely experimental.").

B. SAINT-GOBAIN KNOWS THAT PRELUDE 420 CRYSTALS ARE USED TO DETECT GAMMA RAYS AND KNOWS OF THE EXISTENCE OF THE '080 PATENT

To establish contributory infringement, Section 271(c) further "require[s] not only knowledge that the component was especially made or adapted for a particular use but also knowledge of the patent which proscribed that use." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469 n.4 (Fed. Cir. 1990); *see also Trell v. Marlee Elec. Corp.*, 912 F.2d 1443, 1448 (Fed. Cir. 1990) (remanding for district court to "determine whether and when [the accused contributory infringer] knew of the existence of Trell's patent."); *Sandisk Corp. v. Lexar Media, Inc.*, 91 F. Supp. 2d 1327, 1335 (N.D. Cal. 2000) ("All that is required for a finding of contributory infringement is (1) knowledge of the activity that is alleged to be infringing . . . , and (2) knowledge of the patent . . . ."). However, the Section 271(c) scienter requirement is "***minimal***" (emphasis added). *DSU Med. Corp. v. JMS Co., Ltd.*, 471 F.3d 1293, 1303 (Fed. Cir. 2006).

It is clear that Saint-Gobain had the requisite level of knowledge when it sold its LYSO crystals for use in PET scanners. Saint-Gobain's knowledge of the '080 patent and of LSO crystals is documented in one of Saint-Gobain's own patents – United States Patent No.

6,818,896, which claims priority from a provisional application originally filed on August 15, 2000. Saint-Gobain's patent notes that a "***new family of crystals*** was developed at the end of the 1980s in order to obtain scintillator crystals having a high light yield, short luminescence decay times and a high detection efficiency: these crystals are of the cerium-activated lutetium oxyorthosilicate (LSO) type and ***formed the subject matter of patent US 4,958,080.***" (Ex. 3, U.S. Patent No. 6,818,896 (emphasis added).)

Saint-Gobain's marketing literature also conclusively shows that Saint-Gobain knows its PreLude 420 crystals are being used to detect gamma rays – the infringing use at issue. In fact, as discussed above, Saint-Gobain's product literature focuses solely on this use for its crystals. Saint-Gobain's data sheet explains that PreLude 420 competes directly with other crystals in PET applications, and the data sheet describes the crystal's performance characteristics for detecting gamma rays. (Ex. 13, PreLude 420 data sheet.) Further, Saint-Gobain's Material Safety Data Sheet for its crystal lists the "Product Use" as "Inorganic Scintillation Detector Crystal." (Ex. 14, Saint-Gobain LYSO Material Safety Data Sheet at 1.) In short, Saint-Gobain created and markets its PreLude 420 crystals especially for detecting gamma rays, and Saint-Gobain therefore knows that its customers are using these crystals for that targeted purpose.

V. SAINT-GOBAIN'S ACTIVELY INDUCES INFRINGEMENT BY AIDING AND ENCOURAGING OTHERS TO INFRINGE THE '080 PATENT

Saint-Gobain also induces infringement by instructing and encouraging its customers to directly infringe the '080 patent. Inducement under section 271(b) covers a broad range of conduct by which "one in fact causes, or urges, or encourage[s], or aids another to infringe a patent." *Fromberg, Inc. v. Thornhill*, 315 F.2d 407, 411 (5th Cir. 1963). A party can be held liable for inducing infringement when that party sells a product that is potentially

infringing, and advertises or instructs its customers on how to make an infringing use of the product. *See VLT Corp. v. Unitrode Corp.*, 130 F. Supp. 2d 178, 200 (D. Mass. 2001) ("In fact, it is a textbook violation of § 271(b) where . . . a defendant selling products capable of either innocent or infringing use provides through labels, advertising or other sales methods instructions and directions as to the infringing use." (quotation marks omitted)). To hold a party liable for inducing infringement, there must be "evidence of culpable conduct, directed to encouraging another's infringement, not merely that the inducer had knowledge of the direct infringer's activities." *DSU Med. Corp*, 471 F.3d at 1306 (en banc in relevant part). The requisite intent can, however, be inferred where an accused inducer knew of the patent and intended to induce the act that is alleged to directly infringe the patent. *Golden Blount*, 438 F.3d at 1364 n.4.

Saint-Gobain's data sheet for PreLude 420 provides instructions as to the allegedly infringing use and encourages customers to use the crystals in a manner that infringes the '080 patent. As explained above in Section VI.C.2., the data sheet explains that PreLude 420 competes directly with other crystals in PET applications and describes the crystal's performance characteristics for detecting gamma rays. (Ex. 13.) Moreover, Saint-Gobain's Material Safety Data Sheet for its crystal lists the "Product Use" as "Inorganic Scintillation Detector Crystal." (Ex. 14.) Moreover, the Product Data Sheet teaches customers that the properties of these "lutetium-based" scintillations crystals "match[ ] well with the sensitivity of most PMTs [*i.e.*, a type of photodetectors]." (Ex. 13.) In fact, not only does the evidence show that Saint-Gobain intended PreLude 420 to be used in infringing devices, but Saint-Gobain's marketing suggests Saint-Gobain intended to copy the properties of the LSO crystal covered by the '080 patent. Saint-Gobain's tradename for its crystal highlights that it is a lutetium-based crystal (Ex. 13,

PreLude 420 data sheet (Pre***Lu***de 420, with "Lu" offset in blue font)), and the data sheet for PreLude 420 stresses that the crystal is a "lutetium-based scintillation crystal" (Ex. 13, PreLude 420 data sheet).

By those statements, Saint-Gobain intended to instruct its customers to use PreLude 420 LYSO crystals as scintillators in PET scanners to detect gamma rays. The only logical conclusion to be drawn from Saint-Gobain's deliberate and targeted marketing and its knowledge of the '080 patent is that Saint-Gobain intended to induce its customers to use its LYSO crystals in infringing applications, satisfying the intent requirement under Section 271(b). *See Golden Blount*, 438 F.3d at 1364 n.4.

VI. THE '080 PATENT IS PRESUMED VALID AND HAS BEEN ACKNOWLEDGED AS NOVEL BY SAINT-GOBAIN AND OTHERS IN THE FIELD

As the defendant, Saint-Gobain "bears the ultimate burden of proof at trial of proving invalidity by clear and convincing evidence." *Purdue Pharma*, 237 F.3d at 1365. "Every patent is presumed valid, so if [Saint-Gobain] fails to identify any persuasive evidence of invalidity, the very existence of the patent satisfies [Siemens Medical's] burden on validity" in the context of this preliminary injunction motion. *Id.*

Regardless of the presumption, a brief review of the art shows that the novelty of the '080 patent was widely-recognized in the field. Saint-Gobain's own subsequent patent credited the '080 patent as the first relating to the development of a "new family of crystals":

> A new family of crystals was developed at the end of the 1980s in order to obtain scintillator crystals having a high light yield, short luminescence decay times and a high detection efficiency: these crystals are of the cerium-activated lutetium oxyorthosilicate (LSO) type and formed the subject-matter of patent U.S. Pat. No. 4,958,080.

(Ex. 3, U.S. Patent No. 6,818,896, col. 1, l. 65-col. 2, l. 3 (assigned to Saint-Gobain Cristaux & Detecteurs).)

Others in the field have also recognized the novel advantages posed by LSO crystals when they were first introduced:

> In the late 80's, the Ce doped LSO crystal was disclosed as a good scintillator material. ... Compared with all the other existing known scintillator crystals, Ce doped LSO seems to have the best combination of all the needed properties for PET or other high energy gamma-ray detector application.

(Ex. 4, U. S. Patent No. 6,624,420, col. 2, ll. 28-44.) Indeed, the '420 patent states that the goal behind developing LYSO crystals like the ones Saint-Gobain is now selling was to "retain the LSO scintillating properties," not to improve upon them. (*Id.*, col. 4, ll. 30-32.)

In 2006, the Institute of Electrical and Electronics Engineers' Nuclear and Plasma Sciences Society (IEEE-NPSS) awarded Dr. Melcher, the sole inventor named on the '080 patent, its Merit Award in recognition of the work described in the '080 patent and his subsequent research into LSO crystals. (Ex. 15, Society Awards, at http://www.ieee.org/organizations/pubs/newsletters/npss/0307/society.html at 1). In making the award, the IEEE-NPSS acknowledged that "LSO has become the standard against which new scintillator materials are often compared" and confirmed that "[d]uring the 15 years since its introduction, no scintillator has yet equaled its combination of high light yield, fast decay time, high density ad atomic number, and environmental stability." (*Id.*) "The discovery and commercialization of LSO is often mentioned as one of the major developments in nuclear medical imaging of the last few decades." (*Id.* at 1-2.)

In addition to the acknowledgements of others in the field, the thorough review process applied by the Patent Office suggests that the claims of the '080 patent are novel. On its face, the '080 patent lists nine technical articles, two U.S. patents and a Japanese patent that were considered by the Patent Office Examiner (in addition to the thorough discussion of the prior art

in the "Background of the Invention" section of the patent specification) before the '080 patent claims were allowed. (Ex. 1, U.S. Patent No. 4,958,080.)

As a result, there is no basis for finding the claims of the '080 patent invalid. Indeed, Saint-Gobain has effectively admitted the patent claims are novel over the prior art.

VII. SIEMENS MEDICAL HAS BEEN IRREPARABLY HARMED BY SAINT-GOBAIN'S INFRINGEMENT, AND THERE WOULD BE NO COUNTERBALANCING HARM TO SAINT-GOBAIN TO JUSTIFY THE DENIAL OF A PRELIMINARY INJUNCTION

For the reasons discussed above, Siemens Medical is reasonably likely to succeed in proving that Saint-Gobain indirectly infringes at least one valid and enforceable claim of the '080 patent. Therefore, this Court should apply a legal presumption that the harm to Siemens Medical from Saint-Gobain's infringement is irreparable. *See Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331, 1345 (Fed. Cir. 2003); *E.I. du Pont de Nemours & Co. v. Polaroid Graphics Imaging, Inc.*, 706 F. Supp. 1135, 1144 (D. Del. 1989) ("If a patent holder makes a clear showing of both validity and infringement, irreparable harm may be presumed."), *aff'd without op.*, 887 F.2d 1095 (Fed. Cir. 1989) The presumption applies even where the "merits issues … are close." *Oakley*, 316 F.3d at 1345. "This presumption derives in part from the finite term of the patent grant, for patent expiration is not suspended during litigation, and the passage of time can work irremediable harm." *Bell & Howell Document Mgmt. Prods. Co. v. Altek Sys.*, 132 F.3d 701, 708 (Fed. Cir. 1997); *Hybritech*, 849 F.2d at 1456-57 (The legal presumption of irreparable harm stems from the fact that "the principal value of a patent is its statutory right to exclude."). Particularly here, where Siemens Medical's patent will expire in little over a year, failing to preliminarily enjoin Saint-Gobain would effectively eliminate Siemens Medical's right to exclude others from making the patented invention. *Hybritech*, 849 F.2d at 1456. Accordingly, 35 U.S.C. § 283 provides for injunctive relief to "preserve the legal interests of the parties

against future infringement which may have market effects never fully compensable in money." *Atlas Powder*, 773 F.2d at 1233. Absent preliminary injunctive relief, infringers would be "compulsory licensees for as long as the litigation lasts." *Id.*

The facts bear out the presumption that Siemens Medical will be irreparably harmed if Saint-Gobain and its LYSO crystal customers (*e.g.*, Philips) are permitted to continue their infringing activities. As an initial matter, any inability by Siemens Medical to prevent infringement of the '080 patent would only encourage others in the field to do the same. *See Hybritech Inc. v. Abbott Labs.*, 4 U.S.P.Q.2d 1001, 1015 (C.D. Cal. 1987) (finding it a serious consideration that denial of an injunction would erode patentee's market position, whereas with an injunction other patent infringers were likely to back off), *aff'd*, 849 F.2d 1446, 1456 (Fed. Cir. 1988). "Because the principal value of a patent is its statutory right to exclude, the nature of the patent grant weighs against holding that monetary damages will always suffice to make the patentee whole." *Reebok Int'l Ltd. v. J. Baker, Inc.*, 32 F.3d 1552, 1557 (Fed. Cir. 1994) (*citing Hybritech*, 849 F.2d at 1457).

Damages and a permanent injunction following trial cannot remedy the cumulative injury to Siemens's previously unchallenged patent rights and right to exclude others from copying the patented invention. In this case, Siemens Medical is particularly vulnerable to this type of injury, as there is little over a year left on the term of the '080 patent, a fact that serves both to highlight the injury to Siemens Medical's remaining patent rights and to demonstrate that Saint-Gobain will not be unfairly prejudiced by the imposition of an injunction. *See Atlas Powder*, 773 F.2d at 1234 ("The fact that the patent has only one year to run is not a factor in favor of [Defendant] in the balance of equities. Patent rights do not peter out as the end of the patent term . . . is approached."). Moreover, money damages will not be adequate to

compensate Siemens Medical. Already, at least one of Saint-Gobain's customers, a direct competitor of Siemens in the PET scanner market, has released a PET/CT scanner that was made possible only by infringing Siemens Medical's patent rights. Permitting Siemens Medical's competitors to sell their infringing devices does incalculable harm to Siemens Medical's reputation as the true innovator that brought this technology to the public. *See, e.g., Polymer Techs., Inc. v. Bridwell,* 103 F.3d 970, 975-76 (Fed. Cir. 1996) (noting that "[c]ompetitors change the marketplace . . . Years after infringement has begun, it may be impossible to restore a patentee's . . . exclusive position by an award of damages and permanent injunction.").

The harm to Siemens Medical's business in the form of lost sales and market share should also be considered by this Court. *See, e.g., Polymer Techs.*, 103 F.3d at 975-76. A loss of revenues and goodwill justify finding irreparable harm. *See Bio-Technology General Corp. v. Genentech, Inc.*, 80 F.3d 1553, 1566 (Fed. Cir. 1996). Before Saint-Gobain's infringement, Siemens Medical managed to amass a market share of [redacted] of the U.S. market on the basis of its technological edge from being able to offer the only lutetium-based PET/CT scanner on the market. (Lusser Aff. ¶ 7.)

Since Philips introduced its LYSO-based Gemini TF PET/CT scanner in the third quarter of 2006, Siemens has seen its market share drop from [redacted] to [redacted] on a year-over-year basis. (*Id.* ¶ 7.) At the same time, Siemens Medical has seen a marked shift in customers' reasons for choosing a Philips scanner over Siemens Medical's existing PET/CT scanners. (*Id.* ¶ 9.) Prior to the second quarter of 2006, the overwhelming reason why Siemens Medical lost sales opportunities to Philips was "price." But once Philips announced that it was about to begin selling the infringing Gemini TF product in the second quarter of 2006, customers who chose the Philips PET/CT scanner over Siemens Medical's began to cite the "product" as the factor that

swayed their buying decision. (*Id.*) These sales losses are attributable to the fact that Philips' introduction of the Gemini TF PET/CT scanner caused Siemens Medical to lose PET/CT sales and tainted Siemens Medical's reputation as the technological leader in this field. (*Id.* ¶ 10.)

In addition to the irreparable harm to Siemens Medical's financial and legal interests, Siemens Medical's reputation as the technological leader will be tarnished absent an injunction. When it was the sole source of lutetium-based PET scanners, Siemens enjoyed a reputation as the technological leader and innovator in the market. (*Id.* ¶ 4-6.) Now that Philips and Saint-Gobain are offering their own lutetium-based PET scanner by infringing the '080 patent, Philips has been able to market its products as technologically on par (or even superior) to Siemens Medical's. Even significant monetary awards will not suffice as compensation for the subjective, long-term harm Siemens Medical's technological reputation would suffer from being perceived as just another participant in the PET scanner market.

Moreover, Saint-Gobain's sale of its LYSO crystals for infringing use in PET scanners, such as Philips Gemini TF scanner, [redacted] (*Id.* ¶ 12.) [redacted] (*Id.*) [redacted] (*Id.* ¶ 13.) [redacted] (*See* Ex. 8, Philips Gemini TF

brochure at 14 (characterizing the GSO crystal used in Philips previous scanners as "not optimal for time of flight").)

On the other hand, there is nothing to suggest that Saint-Gobain would be irreparably harmed if it was enjoined from selling LYSO crystals until October 6, 2008 – fifteen months from now – when the '080 patent expires. "Simply put, an alleged infringer's loss of market share and customer relationships, without more, does not rise to the level necessary to overcome the loss of exclusivity experienced by a patent owner due to infringing conduct." *Pfizer, Inc. v. Teva Pharms. USA, Inc.*, 429 F.3d 1364, 1382 (Fed. Cir. 2005). Philips' directly infringing PET scanners have only been approved for sale in the United States since October 2005. (Ex. 9, Philips 501(k) submission to FDA at 3.) Therefore, Saint-Gobain can hardly complain that it is being shut off from a well-developed and long-standing market for its LYSO crystals. Given the length of time left in the patent term and the minimal time for which Saint-Gobain has been offering its LYSO crystals, any harm to Saint-Gobain from preventing it from offering its infringing LYSO crystals is vastly outweighed by the harm to Siemens Medical if a preliminary injunction is not applied. *See Atlas Powder*, 773 F.2d at 1234 ("The fact that the patent has only one year to run is not a factor in favor of [Defendant] in the balance of equities. Patent rights do not peter out as the end of the patent term . . . is approached.").

VIII. THE OVERRIDING PUBLIC INTEREST IN ENCOURAGING INNOVATION FAVORS PRELIMINARILY ENJOINING SAINT-GOBAIN

A weighing of the public interest factors also favors enjoining Saint-Gobain from continuing its infringing activities. Court "have long acknowledged the importance of the patent system in encouraging innovation." *Sanofi-Synthelabo v. Apotex, Inc.*, 470 F.3d 1368, 1383 (Fed. Cir. 2006). "Indeed, the 'encouragement of investment-based risk is the fundamental purpose of the patent grant, and is based directly on the right to exclude.'" *Id.* (quoting *Patlex*

Corp. v. Mossinghoff, 758 F.2d 594, 599 (Fed. Cir. 1985)). The public interest in fostering innovation is directly implicated here. The novelty of the '080 patent is unquestioned, and the price of applying that technology to significantly advance the quality of medical imaging was high. If any infringer can simply take the fruits of Siemens Medical's labor, then Siemens Medical (and other innovators in the field) will have little incentive to dedicate millions of dollars and years of effort toward continuing to make the types of improvements to medical diagnostic equipment that have already helped to save countless lives.

CONCLUSION

For the foregoing reasons, Siemens Medical respectfully requests that Saint-Gobain be preliminarily enjoined from continuing to infringe the '080 patent, including by making, using, selling, offering for sale or importing its infringing LYSO crystals for use in PET scanners.

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CERTIFICATE OF SERVICE

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